

## Message Text

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73 L

ACTION OES-03

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FM USMISSION IAEA VIENNA

TO SECSTATE WASHDC 5184

INFO AEC GERMANTOWN

AMEMBASSY BONN

USMISSION EC BRUSSELS

AMEMBASSY BUENOS AIRES

AMEMBASSY BRASILIA

AMEMBASSY OTTAWA

AMCONSUL RIO DE JANEIRO

C O N F I D E N T I A L IAEA VIENNA 8947

E.O. 11652: GDS

TAGS: IAEA, TECH, PARM

SUBJECT: SUITABILITY OF PLUTONIUM FOR WEAPONS

REF: BUENOS AIRES 7617

1. PARA 5 REFTTEL REFERS TO PLUTONIUM OF "WRONG ISOTOPIC RATIO FOR WEAPONS USE", AND THAT "TO PRODUCE WEAPONS PLUTONIUM WOULD MAKE REACTOR QUITE UNECONOMICAL FOR POWER".

2. THIS OLD HORSE APPARENTLY REFUSES TO STAY BURIED, NOTWITHSTANDING MANY ATTEMPTS AT INTERNMENT.

3. SEE, FOR EXAMPLE, PAGE 12 OF "NUCLEAR THEFT: RISKS AND SAFEGUARDS" BY WILLRICH AND TAYLOR, PUBLISHED RECENTLY BY BALLINGER CO., CAMBRIDGE, MASS.

4. THE AUTHORS NOTE THAT PLUTONIUM-239 ISOTOPE, PRODUCED IN NUCLEAR REACTORS CONTAINING URANIUM-238 (MOST ABUNDANT ISOTOPE OF NATURAL URANIUM) IS PLUTONIUM  
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ISOTOPE OF GREATEST INTEREST FOR USE IN FISSION

EXPLOSIVES. IT IS NOTED THAT ANOTHER ISOTOPE, PLUTONIUM-240, IS ALSO PRODUCED IN NUCLEAR REACTORS BUT THAT ISOTOPE CANNOT BE USED BY ITSELF FOR FISSION EXPLOSIVE. IT IS FURTHER NOTED THAT PLUTONIUM-240 OCCASIONNALLY FISSIONS SPONTANEOUSLY, RELEASING SEVERAL NEUTRONS. AUTHORS POINT OUT THAT ONE SUCH NEUTRON MIGHT START FISSION CHAIN REACTION PREMATURELY WHEN FISSION EXPLOSIVE IS DETONATED. "THIS MIGHT CAUSE THE BOMB TO 'PREDETONATE' AND RELEASE CONSIDERABLY LESS ENERGY THAN IT WOULD IF THE START OF THE CHAIN REACTION HAD BEEN FURTHER DELAYED."

5. AUTHORS POINT OUT THAT RELATIVE AMOUNT OF PLUTONIUM-240, COMPARED TO PLUTONIUM-239, INCREASES WITH LENGTH OF TIME URANIUM FUEL REMAINS IN REACTOR. THEY REFER TO PLUTONIUM-240 ACCOUNTING FOR 10 TO 20 PERCENT OF TOTAL PLUTONIUM IN FUEL WHEN REMOVED FROM TYPICAL US POWER REACTOR. (IN CASE OF HEAVY-WATER MODERATED POWER REACTORS, FUELED WITH NATURAL URANIUM, PLUTONIUM IN FUEL AT DISCHARGE CONSISTS TYPICALLY OF ABOUT 30 PERCENT PLUTONIUM-240.) AUTHORS NOTE THAT SUCH CONCENTRATIONS ARE "SUFFICIENT TO MAKE THE PRESENCE OF PLUTONIUM-240 AN IMPORTANT CONSIDERATION IN THE DESIGN OF A FISSION BOMB. BUT IT DOES NOT PREVENT THE PLUTONIUM PRODUCED IN NUCLEAR POWER REACTORS FROM BEING USABLE IN FISSION BOMBS THAT WOULD BE VERY LIKELY TO PRODUCE EXPLOSIONS IN THE KILOTON RANGE".

6. FOREGOING SHOULD BE UNDERSTOOD TO MEAN THAT NUCLEAR EXPLOSIVE DESIGNERS STRONGLY PREFER USE PLUTONIUM CONTAINING AS LITTLE AS POSSIBLE PLUTONIUM-240. IF ONLY SOURCE OF PLUTONIUM IS POWER REACTOR, DESIGNER WOULD HAVE TO PERSUADE OPERATING AUTHORITIES TO CHANGE FUEL MORE RAPIDLY THAN WOULD BE CASE FOR LOWEST-COST ELECTRICITY, IN ORDER TO MINIMIZE PRODUCTION OF PLUTONIUM-240. THIS WOULD INCREASE OPERATING COSTS WHICH ELECTRICITY CUSTOMERS WOULD HAVE TO BEAR, UNLESS SOMEONE ELSE, INTERESTED IN HAVING PREFERRED PLUTONIUM QUALITY WOULD BE WILLING TO PAY PREMIUM. NOTE THAT EFFECT ON REACTOR OPERATION IS PRIMARILY ONE OF COST; THERE ARE NO TECHNICAL

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LIMITATIONS INVOLVED. ECONOMIC PENALTY WOULD PROBABLY BE LOWER IN CASE OF NATURAL-URANIUM FUELED POWER REACTOR, WHICH DOES NOT REQUIRE SHUT-DOWN TO CHANGE FUEL.

7. IN CASE OF FISSION EXPLOSIVE INTENDED TO BE PART OF REASONABLY SOPHISTICATED WEAPON SYSTEM OR FOR GENUINE APPLICATION TO PEACEFUL PURPOSE, SPECIFICATIONS GIVEN TO DESIGNER WOULD MOST LIKELY BE FAIRLY PRECISE WITH

RESPECT TO EXPLOSIVE YIELD (E.G., KILOTONS). IN THAT CASE, DESIGNER (PARTICULARLY IF NOVICE) WOULD PREFER PLUTONIUM WITH LOWEST POSSIBLE PLUTONIUM-240 CONTENT, IN ORDER AVOID RISK OF LOWER-THAN-EXPECTED YIELD. IN ADSENSE OF SAFEGUARDS AND IF CLIENT HAS ENOUGH MONEY AND INFLUENCE, HE CAN GET IT FROM POWER REACTOR.

8. MANY OTHER SITUATIONS CAN BE VISUALIZED, HOWEVER, PARTICULARLY WHERE HIGH VALUE IS ATTACHED TO ELEMENT OF SURPRISE, WHERE SPECIFICATIONS MAY ONLY CALL FOR YIELD TO BE ABOVE SOME MINIMUM, WITHOUT REGARD TO PRECISELY PREDICTABLE OR MAXIMUM YIELD OR OTHER CHARACTERISTICS SUCH AS DIMENSIONS, DELIVERABILITY BY SOPHISTICATED MEANS, ETC. IN THAT CASE, DESIGNER COULD, AND THEREFORE WOULD, USE PLUTONIUM MOST REAILY AVAILABLE, EVEN IF IT CONTAINS APPRECIABLE AMOUNTS OF PLUTONIUM-240.

9. FOREGOING CONSIDERATIONS HAVE LED BOTH USG AND IAEA TO FORMULATE AND IMPLEMENT SAFEGUARDS AGAINST DIVERSION OF NUCLEAR MATERIAL ON BASIS THAT SO-CALLED "WEAPONS GRADE" PLUTONIUM IS ONLY SUCH IN EYE OF BEHOLDER AND THAT ALL PLUTONIUM, REGARDLESS OF ISOTOPIC CONTENT, CAN BE USED IN NUCLEAR EXPLOSIVES.

10. ONLY MINOR EXCEPTION IS PLUTONIUM WITH ISOTOPIC CONCENTRATION OF PLUTONIUM-238 EXCEEDING EIGHTY PERCENT, WHICH IS EXEMPT FROM IAEA SAFEGUARDS, UNDER NPT SAFEGUARDS AGREEMENTS. EXCEPTION IS BASED UPON FACT THAT PLUTONIUM-238, WHICH IS USED AS HEAT SOURCE, IS NOT RPT NOT FISSIONABLE AND CAN ONLY BE PRODUCED IN SUCH HIGH CONCENTRATION BY COMPLEX PROCESS, NOT RPT NOT AMENABLE, INCIDENTLLY, TO BEING CARRIED OUT IN CONFIDENTIAL

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POWER REACTOR. TO DATE, IAEA HAS RECEIVED NO REQUEST FOR SUCH EXEMPTION.PORTER

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## Message Attributes

**Automatic Decaptioning:** X  
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**Channel Indicators:** n/a  
**Current Classification:** UNCLASSIFIED  
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